Implementing Sustainable Development on the Local Level: Governance, Institutions, and the Effectiveness of Policy Implementation

By

Samuel R. Staley, Ph.D.

DeVoe L. Moore Center

Florida State University

e. sstaley@fsu.edu

v. 850.645.9694

Abstract

This paper evaluates the institutional constraints faced by governments attempting to implement sustainable development policies on the local level. Local governments in the U.S. are limited in their ability to implement comprehensive strategies, and these constraints can be imposed by local political culture, social tolerance, and state statute. An important source of uncertainty is the definition of sustainable development and, as a consequence, defining relevant performance measures. To more fully understand the dynamics political, economic, and social institutions play in facilitating or inhibiting sustainable development policies, this paper examines the experiences and sustainable development policies of using the highly localized case of Santa Monica and a broader and more general comparison of land use, housing, and transportation trends in four larger cities (Houston, Dallas, Austin, and Portland, Oregon). Houston is a large market-based economy while Dallas, Austin, and Portland represent varying degrees of formal commitment to sustainable development practice. The paper concludes with observations about the likelihood US cities can achieve various sustainable development objectives based on the experiences of these cities.

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1. Introduction

Sustainable development, or at least its core principles, is now thoroughly embedded in urban policy and planning, spurred on by professional and public attention to long-term environmental concerns such as Global Warming as well as seemingly more immediate issues such as energy prices, urban sprawl, and energy self-sufficiency. Unfortunately, sustainable development practice has proven problematic: Some cities have taken aggressive approaches to defining sustainable development and implementation but most struggle to identify a strategy that meets local political acceptability. Little research literature exists on whether these policies have been effective in achieving sustainable development objectives. This paper examines policy and outcomes in several US cities to more fully assess their ability and effectiveness in meeting sustainable development goals and objectives. Four of the cities identified for study—Santa Monica (CA), Dallas, Austin (TX), and Portland (OR)—were chosen because they represent a range of formal commitment to sustainable development objectives. Santa Monica, Portland, and Austin have made significant policy commitments to sustainable development, including identifying specific objectives and targets based on long-range plans that have been in place for more than a decade. Dallas also has a policy commitment to sustainable development objectives but lacks the formal planning apparatus adopted by the other three cities. The fifth city, Houston, represents a largely market-driven city that can serve as a useful foil for examining the broad effectiveness of sustainable development policies in the other cities. Combined, the analysis provides sobering lens through which sustainable development practices can be examined from a policy context.

A key focus of this paper is whether a local political approach rooted in representative government can be effective in a social and economic framework that remains fundamentally democratic, private, and market based. The experiences of each of the cities examined in subsequent chapters sheds light on this question as well as the policy dilemmas and challenges they face. The next section examines how political, economic, and cultural institutions fundamentally influence policy implementation in the US, setting up a detailed case study of performance targets and outcomes in Santa Monica, California, a city that has been particularly aggressive in applying sustainable development principles in Section Three. Section Four broadens the discussion to include general trends in population, housing, land use, and transportation consistent with sustainable development objectives in the four larger and more complex economic political environments offered by Houston, Dallas, Austin, and Portland. Section Five discusses the implications for sustainable development policy and urban planning, and while the final section concludes with observations about the future of sustainable development policy and practice at the local level in US cities.

2. Sustainable Development Planning and Practice

As a practical matter, sustainable development planning shifts decisionmaking about land use, urban form, energy use and environmental investments away from market-based institutions toward political ones (Staley 2004; 2001). Most often the legislative process is given more weight and influence over these resource allocation based on the presumption elected officials are in a better position to judge and formulate policies consistent with the public interest than decentralized markets driven by private preferences and actions. In fact, this is implied in any definition of sustainability that establishes a goal of balancing economy, equity, and environment: someone, or some institution, must be responsible for determining how these factors are balanced. In Western nations, the starting point is that democratically elected representatives will provide this balance through legislative action. Thus, the institutional framework presumes that economic interests (as well as equity and environmental interests) are subordinate to the legislative process.

Urban planning practice suggests that cities and municipalities have struggled to implement sustainable development policies (Berke & Conroy 2000; Staley 2006a; 2006b). While many cities incorporate sustainable development principles into their planning, these concepts are not placed within an overarching or formal framework in most cities that guides the decisionmaking process toward these ends (Berke & Conroy 2000). Indeed, sustainability concepts and programs appear to have spread throughout US planning on a more ad hoc or piecemeal basis rather than through a strategic or rational planning framework (with a few notable exceptions). The Portland Bureau of Sustainable Development and Planning claims that more than 400 municipalities followed its lead when it adopted strategies and policies to reduce carbon dioxide in 1994 (http://www.usstianbleportland.org/stp_glo_home.html). Recent research by Skaidra Smith-Heisters at Arizona State University has put the tally closer to 800, with dozens explicitly linking their goals to the United Nations Agenda 21. Nevertheless, evidence to date suggests most US cities still do not frame their planning and urban policy guidelines through the prism of sustainable development.

Notably, virtually all the principles and strategies shift decisionmaking about how resources should be used from a largely private, market-based institutional framework to a legislative and bureaucratic framework. Sustainable development programs, for example, rarely even cite or recommend instrumental market-based approaches to infrastructure policy or resource use such as demand-based pricing for water use that preserve individual choice or work primarily through incentives to conserve or adopt technology. Instead, many programs opt for mandates or directives, such as restricting water use to certain activities, hours, or days, or providing assistance to individuals through direct subsidies.

The preference for non-choice and non-market based policy instruments is not surprising. Markets are considered by many conventional planners as the unregulated expression of narrow private interests and incapable of addressing broader environmental and social issues. Some form of policy intervention is necessary to correct for the perceived failures of the market to balance inequities in resource endowments, slow the pace of natural resource consumption, mitigate negative externalities such as air pollution, or offset the short-sighted desire of households to live in low density automobile-friendly environments.

US planners also have a strong core belief that favors citizen participation, believing that an open, democratic process with broad-based political participation will more accurately reflect the public interest. (Presumably, the expression of public interest will also value sustainable development policies.) The concept of sustainable development as it has developed through the environmental policy reform movement presumes that market-based development is inefficient, and unsustainable. Private interests cannot be reconciled with the goal of preserving natural resources or achieving broader environmental goals (e.g, improved air or water quality). (See for example, the discussion in American Planning Association 2000; Brennan & Withcott 2005.) Thus, public planning is necessary to recalibrate human activity to sustainable levels and trends.

In American planning, however, this shift away from market-based to legislative decisionmaking is problematic. The fundamental principles of American governance are grounded on individual choice and freedom. Thus, moving decisionmaking into a more top-down, centrally directed approach runs counter to deep seeded values and a formal legal system that has existed for more than 200 years. This appears to be less constraining on the local level. A federal system of government enumerates specific and limited powers to a national government but says little formally about how local governments operate. Indeed, local governments are created and enabled by state legislation and do not exist independently of state authority. Thus, local governments can pursue policies that are more centrally directed and planned than the national government (as long as it does not interfere with interstate commerce).

This begs the question of how effective cities can be in meeting sustainable development objectives. The next section explores this question in the context of more than 15 years of experience in a community that should be "hard wired" to embrace the most aggressive forms of sustainable development: Santa Monica, California.

3. The Case of Santa Monica

One of the most straightforward and aggressive approaches to sustainable development is in the Southern California city of Santa Monica. Santa Monica was one of the first cities in the U.S. to thoroughly integrate sustainable development principles into its planning and policy framework. Perhaps most importantly for this paper, Santa Monica is heralded nationally as a model city for sustainable development (Berke, Beatley and Stiftel 2000, pp. 190-192; Staley 2006a; Staley 2006b).

Santa Monica's sustainable development program was also an outgrowth of a bottom-up planning process, suggesting that, at least on the surface, substantial grass roots support exists for its legislative initiatives. This is a crucial element in the context of the open and inclusive American planning process. The bottom up planning approach is consistent with a core value of respecting local control and places substantial importance to citizen participation in the planning process. Indeed, Santa Monica's neighborhood activism is rooted deep in its recent history as power has shifted away from established elites or organized special interest groups (Fulton 1997).

Santa Monica, however, is not typical of U.S. cities. Its population of 89,736 is large by national standards, and represents a 6.7 percent increase over 2000 (after declining in the 1980s and 1990s). As a beach community just a few miles west of downtown Los Angeles, it is a high-income community as well. Its population density is 10,663 people per square mile, one third higher than Los Angeles and nearby beach communities, about twice as dense as San Diego, San Jose, and the state capital of Sacramento. Santa Monica appears to embody several significant advantages for sustainable development planning and practice, including a higher acceptance and tolerance of urban densities, an ecological footprint that is spatially small given its population (in part because of its high density and naturally amenity rich environment, and a political culture that is foundationally progressive and environmentally friendly. Santa Monica's Sustainable Cities Program was initiated in 1994 and is one of the longest running efforts in the United States. The city explicitly identifies its vision with the Brundlandt Commission with the goal of making "Santa Monica a sustainable city—a city that can meet its current needs without compromising the ability of future generations to do the same." (City of Santa Monica, 2002, p. 2) Given its openness to planning and citizen activism, the city in effect "collectivized" decisions about resource use by expanding the legislative prerogative of local government and bringing decision making over appropriate technologies, land use, transportation, and energy use into the public sphere.

The city also attempted to overlay a system of objective measures to evaluate the city's progress. Santa Monica's program uses 66 goals and indicators of clustered around eight strategies and goal areas to measure and guide its progress toward sustainability: Resource Conservation, Environmental and Public Health, Transportation, Economic Development, Open Space and Land Use, Housing, Community Education and Civic Participation, and Human Dignity. The main goal is to reduce the human footprint on the environment, and the city's sustainable development program has adopted overarching environmental policy objectives that include reducing resource consumption, reducing solid waste and pollution generation, safeguarding environmental resources, safeguarding public health, and maintaining healthy and diverse economy to improve livability and the quality of life.

Thus, Santa Monica's political, economic, and geographic environment give it significant advantages in terms of implementing transformative sustainable development planning, including

- More than 15 years of a focused effort to implement sustainable development best practices;
- A stable political culture supportive of sustainable development goals;
- A commitment to performance-based measurement and evaluation;
- A city staff in sync with legislative political goals;
- Higher than average resources to implement policies and goals;
- An amenity-rich environment (e.g. proximity to the beachfront) capable of offsetting policy missteps;

Santa Monica Performance

Santa Monica's progress toward meeting its sustainability goals has been uneven. Table 1 provides a selected list of city targets for selected sustainability indicators, but the following are a few key highlights.

- Greenhouse gas (GHG) emissions: Overall, greenhouse gas emission had declined by less than 1 percent below 1990 levels even though the city's goals were to be at least 30 percent below 1990 levels by 2015 for city operations and 15 percent below 1990 levels citywide by 2015. GHG emissions decreased from 1990 to 1995, but increased from 1995 to 2000. Notably the city reports that residential and commercial GHGs increased while industrial energy use and GHGs declined. While the city has apparently not completed its GHG audit, it expects GHGs to have increased in 2005.
- Water use: Water usage increased through the 1990s, peaking in 2006 before falling to 11.9 million gallons per day, still well above the target of 10.7 MGD.
- Wastewater: Virtually all of reduction in the city's sewage flows occurred between 1990 and 1993 before the sustainability plan was adopted. Flows fell from 10.4 million gallons per day to 8.5 million gallons per day but then increased to 10.8 MGD in 2000. The goal remains to reduce flows 15 percent below 2000 levels, but wastewater flows remain well above the target.
- Energy use: Citywide energy used dropped dramatically between 1990 and 1994 (20.9 percent) according to the city's data (again before the sustainability plan was adopted), but increased 22.2 percent between 1994 and 1997. Energy use is now higher than 2005, but lower than 1990 (and still higher than the average for California).
- Renewable Energy: The City has also targeted 25 percent of citywide electricity to be from renewable sources by the year 2010. One percent of all electricity should come from the clean distribution generation by 2010 according to the plan. As of 2006, the last year for which data were publicly available, 18 percent of electricity use was from renewable energy (a slight drop from the year before). Notably, the investor-owned utility that service Santa Monica, Southern California Edison, reports a renewable energy portfolio of 16 percent although it does not have plans to expand this portfolio beyond state of California mandates.
- Energy Self-sufficiency: The city embarked on a plan to strive toward energy self-sufficiency by 2020 when it established Solar Santa Monica. This was part of the city's Community Energy Independent Initiative and focuses on encouraging homeowners and businesses to adopt solar panels. The city reports that 20 solar projects were implemented in 2007.
- Reduced automobile use: Driving alone decreased from 68 percent to 66 percent in 2008. Carpooling is about 14 percent (an increase of 1 percentage point from 2007). The city reports that mass transit and bike ricking remained steady.
- Transit Ridership: Bus ridership increased and peaked in 2001, then stabilized ranged between 20-22 million riders for most of the 2000s according to the National Transit Database, despite an increase in Santa Monica's population. Bus ridership in 2010 was at 22.3 million riders accounting for 76 million passenger miles, below the 2001 peak of 22.9 million riders and 83 million annual passenger miles. Santa Monica has a mandatory parking cash-out program where businesses with 50 or more employees who lease parking spaces are required to offer their employees the option of the cash equivalent for their parking space if they choose to give up their space.
- Bike lanes: About 3 percent of Santa Monica's arterial streets have bike lanes, well short of the city's 2010 target of 35 percent. However, a bike path spans 3.11 miles and 20 bike routes cover 18.78 miles of roadway.

- Ridesharing: The city has achieved more success with ridesharing, but the role of the sustainability program is unclear. Ridesharing increased most dramatically between 1993 and 1995 when the number of riders per vehicle increased from 1.13 to 1.29 (a 14.2 percent increase and near the Southern California average). The number of riders per vehicle increased from 1.29 to 1.37 between 1995 and 1997 (a 6.2 percent increase and 7.8 percent higher than the Southern California average), but has remained essentially constant since then. Thus, the sustainability program may be credited with an initial boost (assuming no other factors such as rising congestion), but not sustained improvement. Notably, the ridesharing data exclude major employers such as the U.S. Postal Service, UCLA/Santa Monica Hospital, and local public school district, and federal and state agencies.
- Jobs-housing balance: The city has an explicit goal of trying to achieve a ratio of residents to employment of 1.0, suggesting that the number of jobs provided within the community equally balances the number of workers living in Santa Monica. New commercial growth in the city, however, has pushed the ratio of jobs to housing ratio to 1.56 in 2008 from 1.36 in 1998

Of course, Santa Monica's lack of progress in meeting its goals and objectives does not necessarily imply that its policies have had no impact. In fact, Santa Monica has experienced an increase in volume of organic food from its four farmers markets. About 8 percent of Santa Monica residents report being vegetarians, about 2.5 times the national average, but trend data is not available and self-selection bias may well distort these numbers. An optimist could argue that the city might have become much more unsustainable (or at least performed worse along its chosen metrics) if these policies had not been adopted. The inconsistency in the performance measures, however, suggests that the city's policy effectiveness has been erratic at best (even though the city's 2010 performance report card gives itself an "A" or "A-" for effort on all eight strategies and goal areas).

The implications are sobering for sustainable development policy implementation. Santa Monica's political, social and economic environment appears ideally suited for embracing detailed and aggressive sustainable development policies initiated and implemented by the local government. Yet, along most metrics, the city has fallen far short of its goals. While a tempting reaction is to simply say the city has not tried hard enough, its own effort marks suggest that a more fundamental problem may be facing the city. The institutional constraints may simply be too great to compensate for the intent and desires of policymakers and general public to accomplish its policy goals.

Given Santa Monica's limited ability to meet its goals after more than 15 years of formalized efforts to transform its community, perhaps a larger question should be asked in terms of strategy: Is the top-down, centrally directed approach the most effective way to meet sustainable development objectives? Unfortunately, a case study of a consciously decentralized and market-based approach to sustainable development does not exist in the US.

Table 1: Targets and Performance for Selected Sustainability Indicators in the City of Santa Monica

Indicator	***2010 Target (citywide)***	***Performance 1994-2000***	***Performance 2000-2010***
Energy use (btu)	Pending based on study of greenhouse gas emission study in 2003	Energy use increased 22.2% between 1994 and 1997	Electricity & natural gas consumption higher than 2005 but lower than 1990; electricity generation is 35% higher than California average (but significantly lower than the national average).
Water use (million gallons per day)	Reduce use by 20% by 2010 (2000 baseline)	Increased 9.8% between 1995 and 2000	Water use increased and peaked in 2006 before falling to 11.9 MGD, higher than the target of 10.7 MGD
Solid waste generation (tons)	Do not exceed 2000 levels	Increased 20.9% between 1995 and 2000	Volume increased 20% between 2003 and 2006.
Solid waste recycling (tons)	Increase amount diverted to 70% of total by 2010	Share diverted increased from 14% in 1995 to 55% in 2000.	Diversion from landfills exceeds state targets and remains stable at about 70%.
Wastewater flows (million gallons per day)	Reduce flows 15% by 2010 (from 2000 levels of 10.8 MGD)	No change between 1995 and 2000.	Increased to12.0 MGD in 2006 and fell to 10.6 MGD in 2009; only year below 2000 levels was 2008, but well above target.
Organic Food	Increase percent of organically grown and low-chemical produce sales	Not available.	Sales of conventionally growth produce at four local farmers markets has fallen 14.2% to $1.2 million in 2008 as the share has fallen from 20% in 2001 to 9 percent.
Food choices	Increase % of residents reporting vegetable-based protein as primary source of protein for at least half their meals	Not available	No trend data available; 8% of residents are vegetarian according to a 2003 survey.
Vehicle ownership	Reduce average number of vehicles per person by 10% by 2010	Not available	Vehicles per driver has fallen from 0.94 in 2000 to 0.86 in 2003 and remained steady through the mid-2000s, effectively meeting the target of 0.85.
Vehicle ridership	Increase ridership per vehicle to 1.5 by 2010 for businesses > 50 employees	23% increase between 1997 and 2000 to 1.39 riders per vehicle	Riders per vehicle increased to 1.61 in 2008, exceeding target.
Transit ridership	Upward trend	Increased 17% between 1990 and 2000.	Ridership dropped from 23 million 2001 to 20-22 million riders.
"Green" construction	100% of all buildings greater than 10,000 square feet in 2010 eligible for LEED certification.	Not available	Cumulative share of buildings greater than 10,000 sq. ft LEED certified is 8.4%
Economic diversity	No single economic sector more than 25% of total economic activity/output	Not available.	

Source: Targets from Santa Monica Sustainable City Plan published in revised edition adopted October 24, 2006; performance data through 2000 from *Sustainable City Program: Status Report 2002*, City of Santa Monica, Environmental Programs Division; performance data through 2010 taken from City of Santa Monica, Office of Sustainability and the Environment, accessed by author on February 8, 2012.

In the absence of the kind of detailed case study Santa Monica provides, an examination of general trends toward meeting goals of sustainable development advocates recommend among cities with varying degrees of institutional commitment to the concepts and principles might shed light on the policy constraints and potential embedded in different approaches. The next section of this paper shifts gears by examining the performance of larger cities in an attempt to gain better insight into organic forces that might influence the ability of cities to achieve sustainability goals along these lines.

3. Sustainability, Smart Growth and Organic Development: The Case of Houston

Santa Monica, of course, experienced progress toward some of its sustainability goals. However, a larger question emerges that is the mirror of the issue discussed in the previous section: If a city can do little to tangibly change its course, do larger forces that naturally lead to more sustainable cities exist? This section delves into this question in more depth although, unfortunately, the methods are heuristic rather than quantitatively rigorous. Cities, particularly large ones, have important organic characteristics that may have important implications for sustainability and environmental conservation. Glaeser (2011) is the most recent researcher to suggest that dense, large cities are more environmental and economically viable than smaller, low density cities. While the case study of Santa Monica showed the detailed lengths to which cities can go to fulfill their goals, in sustainable development policies have implied a goal of significantly shifting the general pattern of urban growth toward higher densities, more mixed uses, and less automobile use because these lifestyles are expected to be less energy intensive and therefore shrinking the human ecological footprint (Ewing 2008).

Houston, Dallas, Austin and Portland

This section examines four cities with different policy orientations toward urban development, planning and transportation policy to examine this issue. Three of these cities—Houston, Austin, and Dallas—are in Texas, a state largely considered market-oriented. Counties, for example, are not permitted by statute to zone land or levy impact fees. Cities exercise land-use control over territory immediately adjacent to their boundaries. In the absence of publicly provided utilities, private developers can provide infrastructure for their developments through Municipal Utility Districts, or MUDs. Thus, urban growth boundaries, urban limit lines, and other forms of aggressive growth controls are rare or nonexistent.

Houston is notable as the fourth largest city in the US (2.1 million people), the sixth largest metropolitan area, and the largest without land-use zoning or a conventional comprehensive plan. In fact, voters have turned down zoning at the ballot box on three separate occasions (most recently 1993). While the city has a comprehensive plan, public development control is limited largely to ensuring new development adheres to performance measures for providing public infrastructure. Historically, these performance criteria have been restricted to water, sewer, and stormwater runoff, although recently traffic impacts

have been added to statutory revisions. Some districts also regulate land development through set-backs and height restrictions, but a substantial portion of the city is completely unrestricted in terms of land use development. Individual parcels are governed by private covenants, and newer subdivisions are regulated through homeowners associations, but properties inside the traditional urban core (the I-610 loop) often have unrestricted covenants. Thus, property owners and developers are able to develop according to demand, including replacing single-family detached housing with high-rise office buildings or mixed-use residential towers.

Dallas is the second largest city in Texas (1.2 million people), the ninth largest city in the US, and in the fourth largest combined metropolitan area in the nation. Dallas has traditional zoning in place, and has explicitly embraced a policy of encouraging transit use, mixed used development, and downtown revitalization during the 1990s, all key goals of sustainable development advocates and its US-based policy cousin Smart Growth. Dallas has nearly 100 miles of light and commuter rail, more than half built in the 2000s. In contrast, Houston has just 15 miles of light rail along one line. Dallas has also put an emphasis on downtown development, and transit oriented development in an effort to encourage higher density development and encourage transit ridership and use. A report by economists from the University of North Texas at Denton suggested that DART's investment in transit has contributed to investments of $3.3 billion near or around transit stations since 1999 (Weinstein & Clower 2005).

Austin, Texas is the fourteenth largest city in the US (790,390 people) and 34th largest metropolitan area in the US. The city of Austin is also one of the most rapidly growing and its metropolitan area has doubled in population since 1990. Austin is home to the flagship campus of the University of Texas, hosts the state capital, and its concentration of high-tech companies (which include Dell Computer and IBM) has led to the region to be dubbed the Silicon Hills. At one point, a nonstop flight from Austin to San Jose, California was dubbed the "nerd bird." More recently, the economy has benefited from the growth of a biotechnology and pharmaceutical industry that now includes at least 85 firms (the nation's 12th highest concentration by one ranking). For the purposes of this report, however, Austin has also consciously developed its reputation as a "Smart Growth" community and explicitly adopted sustainable development strategies that include reduced reliance on automobile travel, mixed used development, and explicit planning to direct development into higher density and more concentrated and use patterns with an emphasis on downtown. In 2003, the city adopted resolutions requiring its city-owned utility, Austin Energy, to develop strategies that included goals to reduce GHGs and increase the renewable energy portfolio to 20 percent of electricity produced by 2010 (subsequently modified to 30 percent by 2015). A Climate Action Plan adopted in 2007 included a goal of powering all city facilities from renewable energy by 2012, inventory GHGs, and develop a comprehensive GHG reduction plan.

Most recently, the city council has "established 'sustainability' as the central policy direction" according the city's most recent comprehensive planning initiative *Imagine Austin* completed in the fall of 2011. Among the primary city goals is a compact and "connected" city, and the plan outlines steps to fashion an urban hierarchy around regional centers, town centers, and neighborhood centers that shift the balance of housing to higher density townhouse, rowhouse, and apartments and away from single-family detached housing. For the most part, however, the new plan builds on earlier initiatives, including

an investment in rail transportation (opening in 2010) and bikeways and the adoption of a climate action plan.

Portland, Oregon is the 29th largest city in the US (583,776 people), the 23rd largest metropolitan area in the US, and one of the proverbial "poster children" of Smart Growth and sustainable development. Portland's extensive commitment to GHG reduction, sustainability, and Smart Growth has been well documented elsewhere and, in fact, served as a model for the US through much of the 1990s and 2000s. Beginning with the state's commitment to statewide land use planning in the 1970s, urban-growth boundaries have been used to constrain low-density development and promote transit use. These policies, while prior to much of the current sustainable development discussion, are widely recognized for their ability to increase housing density, reduce automobile use, promote transit-oriented development, and create more compact cities with the downtown serving as the central point for the region. Most policies are coordinated through the city's Bureau of Planning and Sustainability, although the regional growth plan is implemented through Portland Metro, the nation's only election regional planning agency. The city was the first in the US to adopt a carbon reduction plan (in 1993). In 2001, the region's largest county Multnomah County joined the city of Portland as part of a joint Climate Action Plan. In many ways, Portland has implemented a sustainable development program as detailed as, and perhaps more ambitious than, Santa Monica's given the size of the city and the scope of the population and economy impacted by their policies. Moreover, Portland is recognized for its steadfast commitment to these goals over more than two decades, and the city reports substantial progress along core indicators such as carbon emissions (current 1 percent below 1990 levels), transit ridership (prolonged steady increases), the nation's highest level of bicycle commuting (at about 5 percent), and declines (albeit modest) in vehicle miles traveled and solo driving.

Unfortunately, a common source for key sustainability indicators such as GHG emissions is not available on a city or metropolitan level. Each city also tends to craft its own strategy for sustainability; even if the features of the sustainability plan are similar, the metrics used to achieve their goals are often not (e.g., the role of nuclear power as an alternative to fossil fuel energy production may or may not be considered part of the plan). Thus, comparing cities along sustainability metrics is problematic. Not surprisingly, most evaluation of local sustainability plans have tended to focus on intent by examining goals and targets and inputs such as what resources are being devoted to programs to achieve the targets. Yet, as the case study of Santa Monica suggests, actual performance may deviate substantially from goals and targets.

Thus, this section of this paper can be little more than suggestive. In general, sustainability objectives have triangulated around three broad themes: Reduce energy use, reduce GHGs, and improve environmental quality. Direct measures of these goals are not available. In lieu of more direct measures or concrete baselines, many cities have adopted a more general goals such as increasing urban densities and expanding transit services with the expectation these larger goals can be met. If sustainable development policies have been effective, we would expect to see significant changes in directions or trajectories for some of these broader indicators. Moreover, the four cities selected for analysis in this section are particularly useful because they represent fundamentally different policy orientations to

sustainable development. Houston is effectively a "free market city," allowing development patterns to conform to market demand with transportation investments largely providing a supporting role rather than a driver of change. Portland is on the other end of the spectrum, taking the top-down sustainable development planning as seriously as Santa Monica within a supportive state growth management framework that minimizes dissent and promotes stability to facilitate plan implementation. In between are Dallas and Austin. Dallas represents a "smart growth light" framework where the city operates primarily through incentives and an active attempt to shift development patterns through transportation investments, particularly transit and light rail. Austin is the most aggressive city in Texas, using its city-owned utility serving 1 million people to drive change and actively reforming its building codes to promote higher densities and more mixed use. (In 2006, the city also adopted a "McMansion Ordinance" that limited homes to 2,300 square feet, including basements, in most parts of the city.)

Land Use & Housing Patterns

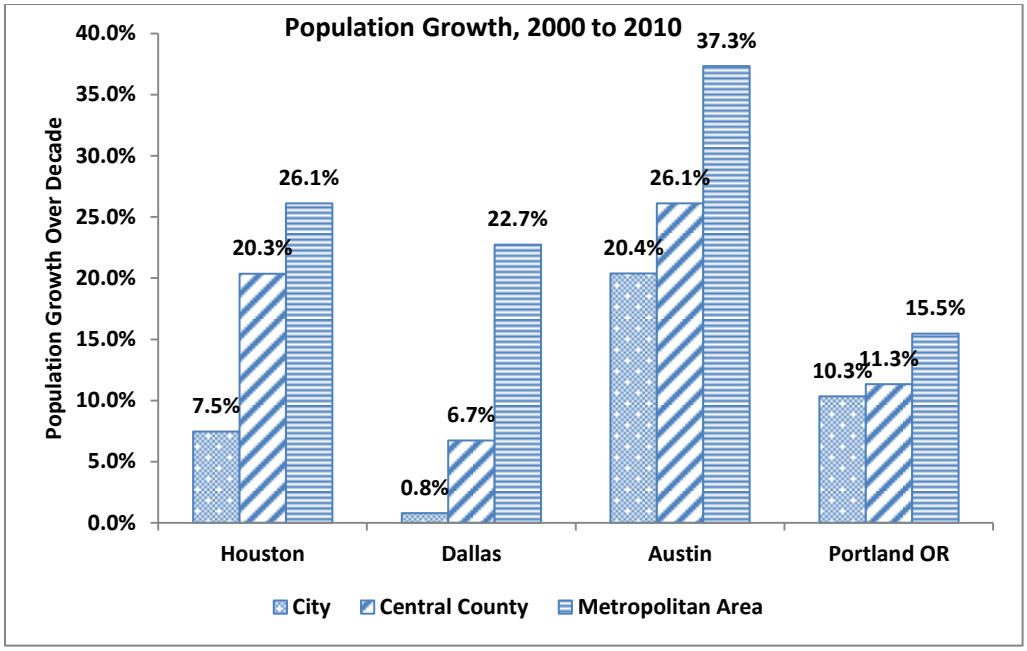
Houston, Dallas, and Austin have ranked among the fastest growing metropolitan areas in the nation. Portland, while growing, has experienced notably more moderate growth. Nevertheless, the city of Portland appears to be holding its own, at least in the 2000s, as the city's population grew at two-thirds of the rate of the metropolitan area overall (Figure 1). The Texas core cities fared worse in terms of growth rates compared to the metropolitan area, although Austin posted growth of over 20 percent. Thus, at least in terms of competiveness within the metropolitan area, the cities with the stronger sustainability agendas appeared to attract larger shares of the regional population (although the city of Houston attracted the most people in absolute numbers, 145,820 over the last decade.) Extending the population growth data over two decades gives Houston a slight edge with population growth rate of 28.8 percent. This compares favorably to the 33 percent growth for Portland although about one third of the rate attracted to the city of Austin.

While the metropolitan area population trends might be misleading since a number of factors influence population growth, including job growth, taxes, efficiencies from agglomeration and urbanization, industry clusters, housing affordability, etc., the data on central city population growth in effect control for many those factors since most operate on regional not local level. The key trend is on how the city competes effectively within its metropolitan area. Notably, in each case the majority of the metropolitan areas' population growth was concentrated outside the central city during the 2000s. Austin was the most competitive, with a 28 percent share of the region's population. Portland was able to attract just 18 percent of the region's growth. Houston captured 11 percent and Dallas was able to attract just 1.2 percent.

A more complicated story emerges when changes in population density are compared among the four cities for the last two decades. Taken as a whole, Austin and Portland, the two cities with the most aggressive sustainable development programs, experienced an increase in density of nearly identical rates at 24 percent. Houston's density increased by 15.9 percent while Dallas experienced an increase in density of 19.6 percent. Yet, virtually all the increase in density in Houston, Austin, and Dallas occurred

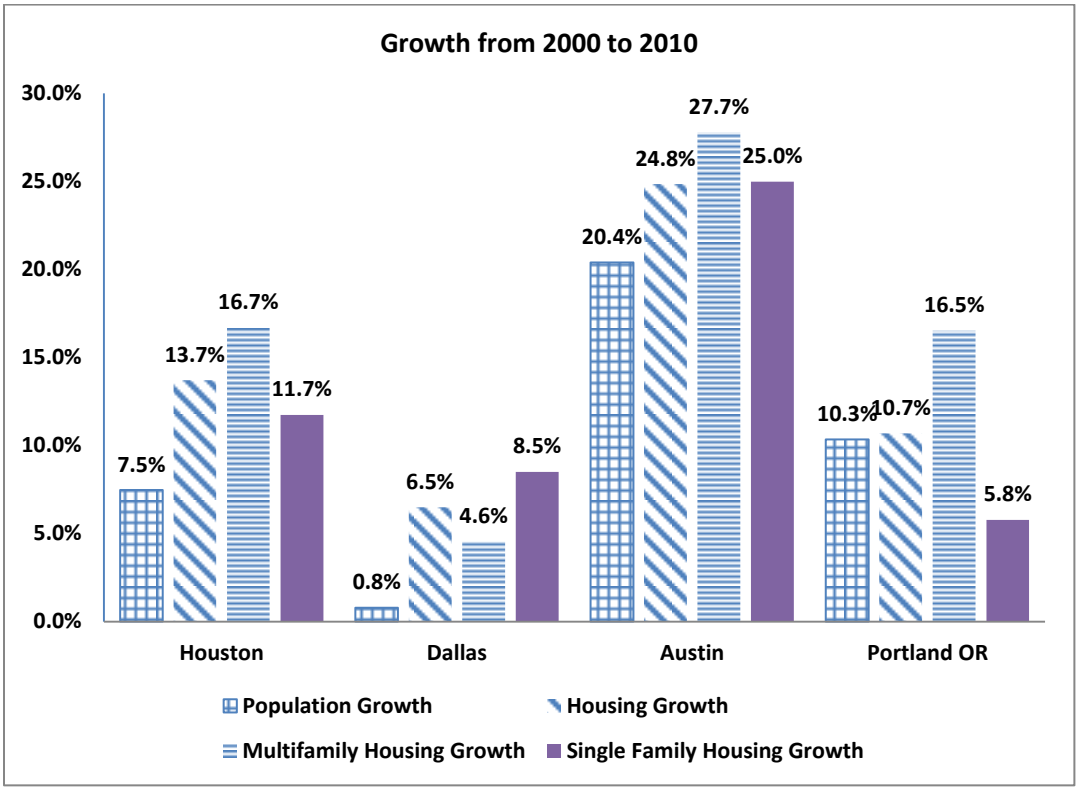
between 1990 and 2000. Density increased by less than 2 percent in Austin and Dallas and about 4 percent for Houston, no doubt reflecting the slowdown in the housing market about the middle of the decade. Houston's density increased at nearly double the rate of Austin and Dallas, and this result likely reflects the relative resilience of the Houston housing market which slowed later than other markets (Staley 2009). Portland's increase in density was stable, registered a 12.3 percent increase in the 1990s and an 11.0 percent increase in the 2000s. While the causes are unclear from this data, a likely explanation is the urban-growth boundary that was simultaneously restricting land development outside the central city county of Multnomah and explicit restrictions on lot size, including maximums below the average for the period, that increased densities throughout the metropolitan area (Staley, Edgens and Mildner 1999).

Figure 1



The effects on these restrictions in Portland become clearer when housing types are examined (Figure 2). The growth of single family housing was about half the rate of housing growth overall and nearly one third the rate of multifamily housing during the 2000s. In contrast, single family housing increased at about the same rate as multifamily housing (and overall growth) in Austin and faster than multifamily in Dallas. Houston was adding multifamily units at about 40 percent higher rate than single family housing, despite its lack of planning guidance and zoning regulations promoting higher density and multifamily development. Thus, in terms of housing mix, Houston was adding multifamily units at rates higher than either Dallas or Austin even though they had more clearly defined Smart Growth and sustainable development programs in place.

Figure 2



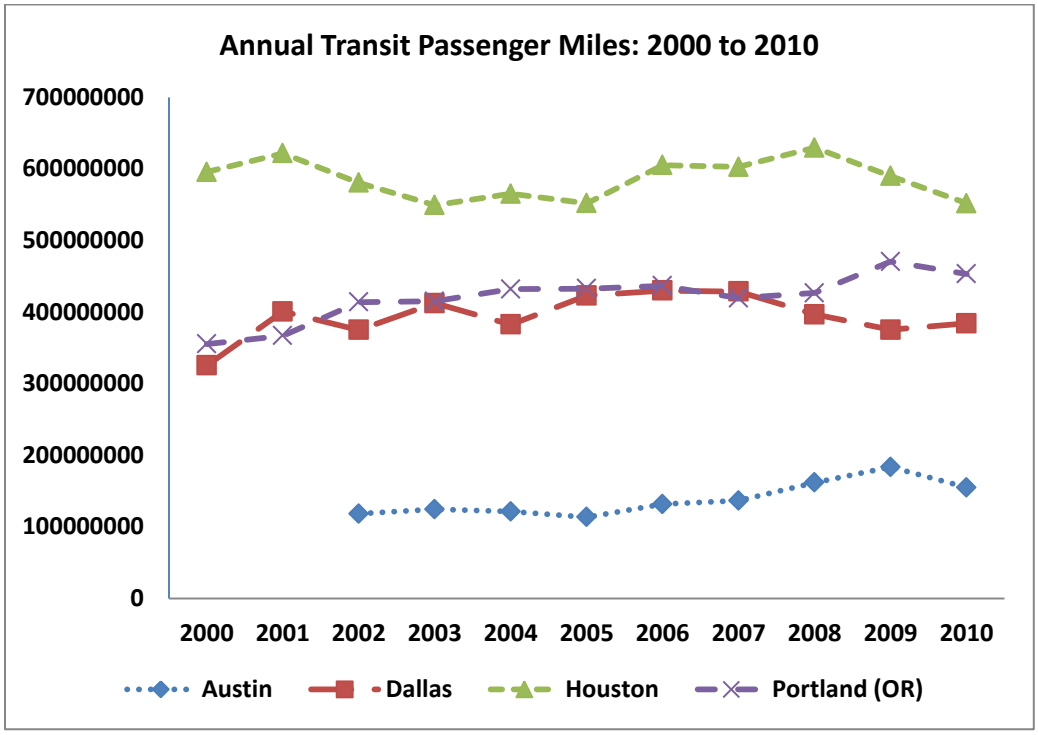
Transit and Travel Patterns

Another element critical to virtually all sustainable development programs is a conscious effort to reduce vehicle miles traveled by shifting automobile users onto public transit. Importantly, all four cities have relatively modest levels of transit use. The Portland metropolitan area has the greatest market share among commuters with 6.2 percent reporting using transit as a primary mode for work trips in 2010 (according to U.S. Census data). Houston and Austin have the next highest market share with just 2.3 percent of commuters while Dallas-Fort Worth trails even those small numbers with a 1.4 percent market share. All four cities have experienced an erosion of market share since 2010, although Portland's decline is a modest 0.1 percent and its bicycle share increased to 2.2 percent in 2010 from 0.8 percent in 2000. Telecommuters outnumbered transit riders in Austin and Dallas-Fort Worth.

Data from the National Transit Database, however, are likely better indicators of transit ridership trends. NTD data are annual and reported by the transit agencies. The database also provides useful information about the extensiveness of the transit service as well as the transit service area's population and geographic size (in square miles). One of the most immediate observations from the annual data during the 2000s is that Houston's transit usage is greater for these cities, significantly larger than Dallas (although its service area is about half the size of Houston's). Even though transit's market share is very

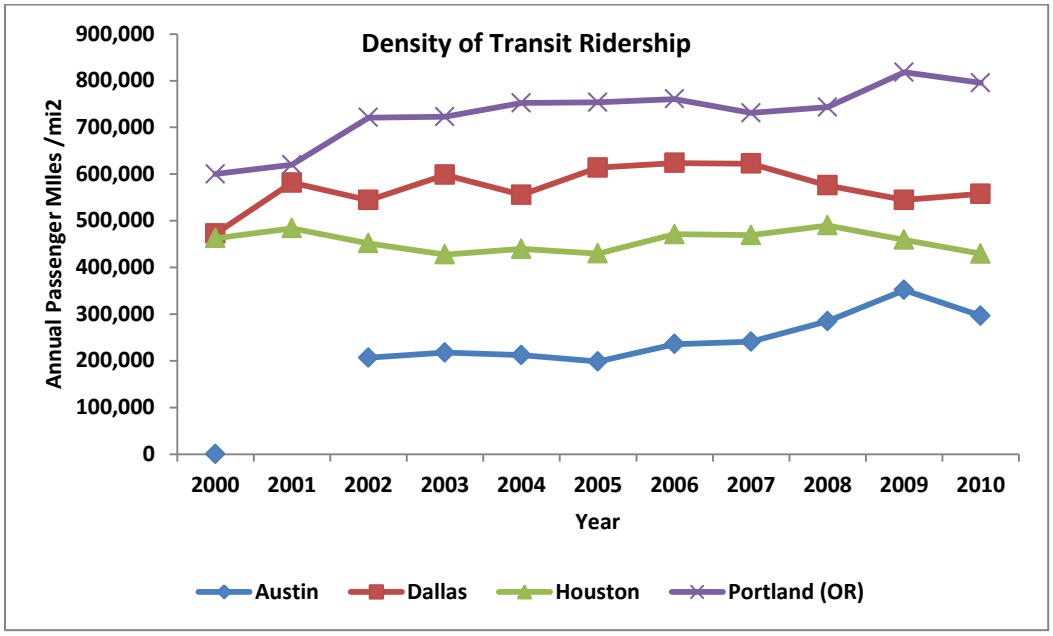
small, Houston's transit system has a large footprint, with (mostly) buses serving 1,285 square miles and a service area population of 2.9 million people in 2010. In contrast, Dallas serves a population of 2.4 million with a service area 689 square miles. Portland services an area of 570 square miles and a population of 1.5 million. Austin services an area of 522 square miles, nearly the size of Portland, but a population of 935,595. Only Dallas and Portland have substantial rail investments, with Portland claiming one of the nation's most extensive and comprehensive among "new rail" cities with 112 route miles compared to Dallas's (also a new rail city) with 97 route miles.

Figure 3



Of course, annual passenger miles are skewed by the large absolute size of Dallas and Houston, which rank among the nation's largest. The density of the transit use can be examined by dividing annual passenger transit miles by the service area, essentially creating a metric of transit use per square mile. Notably, this is a measure that reflects demand (transit use) and supply (service area). This metric produces a more mixed in comparison among the cities (Figure 4). Portland becomes the clear top performer among these cities with a significantly higher number of annual passenger miles per square mile and *increasing* ridership. Houston's transit service is extensive, ridership appears to be spread more thinly across the region than Dallas. Moreover, Houston's ridership is in a slight decline despite the increases in density the city experienced over the last two decades. Austin's transit system performs well below Dallas and Houston, although the ridership density appeared to be increasing until 2009. These data also appear to reflect the lower market share for transit registered in these cities revealed in the 2010 census data.

Figure 4



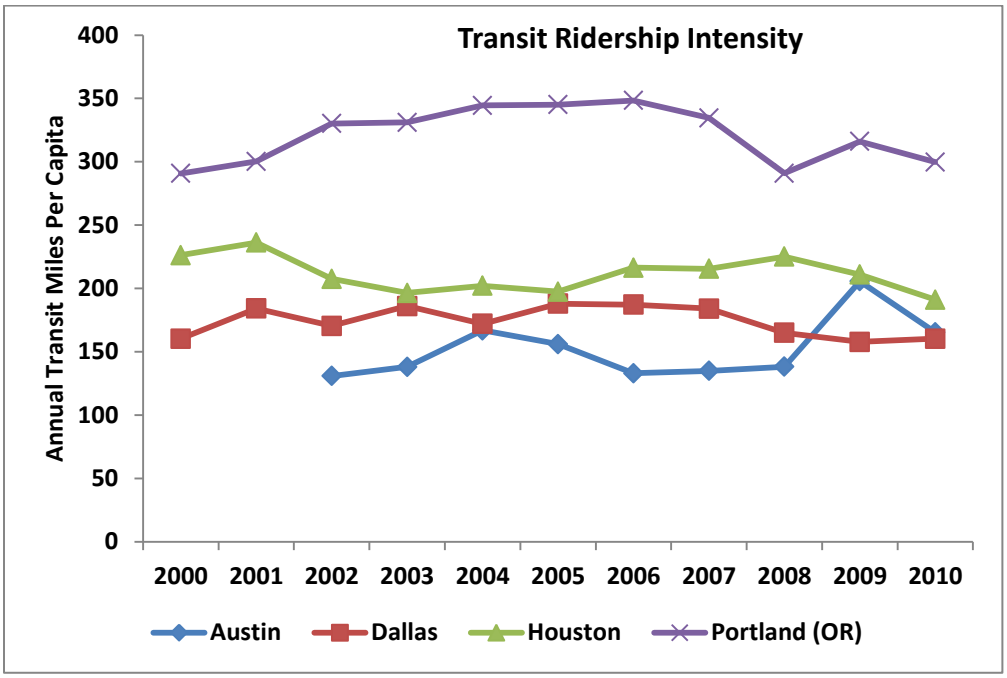
Yet another possible metric of transit effectiveness is the intensity of transit use on a per capita basis. Dividing the annual passenger miles per square mile by service area population provides an indicator of how intensive transit ridership is in each of these cities. Once again, Portland's transit system appears to perform well, although the intensity appears to wane in the latter years of the 2000s, possibly reflecting the onset of the recession (Figure 5). Houston's transit performance also appears to fall while trends in Dallas appear more stable. Austin's ridership appears to gain ground on both Dallas and Houston, but then plummets between 2009 and 2010.

Perhaps the most surprising implication of the transit analysis is that Houston is able to maintain a relatively robust transit network and ridership compared to three other cities that have made fare greater commitments to transit and programs aimed to reduce automobile driving. While Houston has a light-rail line in operation, it covers just 15 route miles. Houston has, however, invested more than either Portland, Dallas, or Austin (at the time of this writing) in road pricing through the use of toll roads and High-Occupancy Toll Lanes. The HOT Lanes, in particular, have included provisions for reserving road space for express buses and Bus Rapid Transit, allowing transit to gain market share alone some corridors even as highway capacity was expanded (Balaker & Staley 2006, pp. 133-134).

One additional note: Houston, unlike Austin, Portland, and Dallas, is characterized by multiple large scale employment centers. In addition to the downtown, they include Uptown, the Gallaria, Texas Medical Center, and the Energy Corridor. As the city further develops, the potential for providing transit along corridors linking these cities is likely to grow even without a dominant downtown central business district.

In short, the least regulated city of the group appears to perform equally as well along some of these measures as the most regulated cities.

Figure 5



4. Institutional Implications for Sustainable Development Policy

The implications of this analysis for sustainable development practice on the local level are murky. In part, Santa Monica's limited success is inherent in the legislative policymaking process. Political concerns, which may or may not be consistent with sustainable development or achieve sustainable development goals, drive legislative policymaking rather than scientistic or rationalist approach. In fact, several policies adopted by the city may further an environmental policy agenda but not promote sustainable development. Investing substantial resources in relatively expensive transit vehicles that use alternative fuels, for example, provides few social or sustainable development benefits if transit continues to be a small share of the overall transportation solution, or the city fails to invest in improving roads and highways to reduce congestion. If the Green Building Program requires using materials and technologies that are substantially more expensive and energy intensive for new construction, the industry risks using more energy than if it relied on cheaper materials or more efficient conventional technologies. To the extent Santa Monica's sustainable development framework has become little more than an aggressive environmental policy agenda, sustainable development is no longer a set of objective goals and measures rationally tied to efficient resource use. Rather, it becomes a relativist program rooted in the local politics of the community.

Moreover, the analysis of Houston, Dallas, Austin, and Portland suggests that some of the trends that lead to more sustainable cities according to conventional wisdom, such as higher density and more mixed use, may be an organic part of a growing city. Some have argued that Houston's sprawling beginning may actually have established a foundation for higher density, mixed use, more transit friendly development that can be nurtured through natural market forces. Perhaps, then, one element of sustainable development policy should focus less on attempting to consciously manipulate behavior and, instead, capture the natural tendencies of urban development.

A more general and perhaps significant limitation on sustainability programs such as those adopted by Santa Monica, Portland, and to a lesser extent Austin is their narrow, localized approach to cities and urban development which underestimates the role technology, economic trade and innovation improve productivity, efficiency, and resource conservation. History has shown that economies that remain local and self-contained are unsustainable. Self-sufficient economies stagnate and decline, while open economies grow (see the discussion in Staley 2006a; 2006b). Economies that specialize in production tend to be the most productive, most technologically advanced, have the highest standard of living, and, in the end, the most resilient and sustainable economies. The importance of large markets in sustaining urban economies is increasingly apparent (see Glaeser 2011). Contemporary cities can house, cloth and feed more people because of technological innovation. Technological progress and economic wealth have accompanied a number of significant "environmental friendly" trends, including:

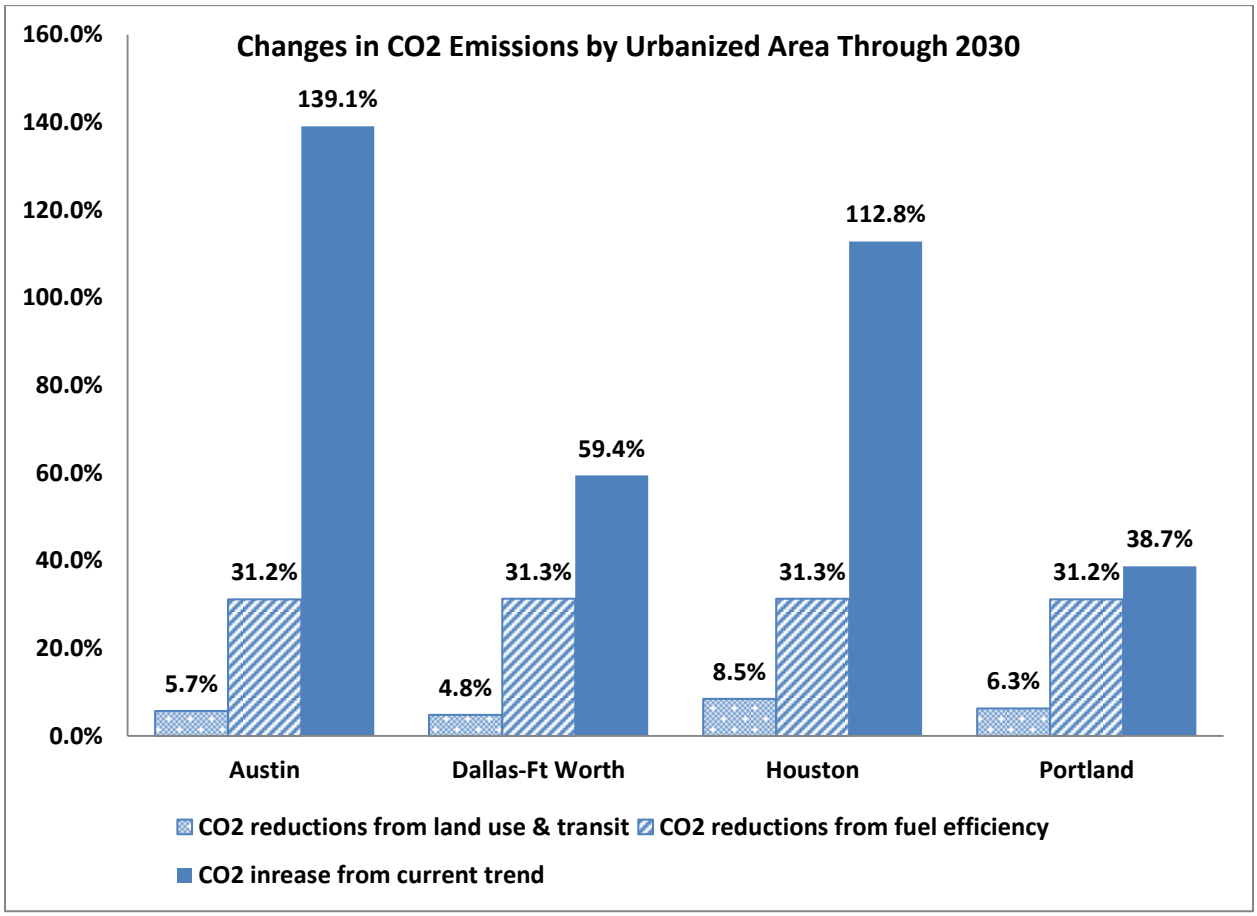
- Significant reductions in farmland due to increases agricultural productivity (Staley 1999);
- Increases in the amount of timber and forests since 1900;
- Improvements in air quality as a result of environmental regulations and shifts to cleaner industries and a service-based economy;
- Changing demographics have increased the demand for higher density and mixed use urban development (Myers & Gearin 2001);
- Innovation in agriculture has *reduced* human demands on land even as the U.S. agricultural industry *exports* significant shares of its output of domestically produced rice, wheat, cotton, soybeans, and corn (Staley 2000, p. 6).

Thus, unlike other species, humans have the ability to reduce their impact on the environment through technological innovation and economic growth. Market institutions are crucial to sustaining innovation that reduces human demands on the natural environment while improving overall quality of life and standard of living because they encourage experimentation and invest in untried niche markets. Not surprisingly, low-income nations face much more severe environmental challenges than industrialized nations.

In developed nations, this may imply that significant headway in addressing environmental goals may well come from technology, not changes in human behavior. To some extent, this is implied in recent work by David Hartgen (2011) and his colleagues on the relative importance of different carbon reduction strategies in varying metropolitan areas (Figure 6). Current trends suggest that carbon emissions will more than double for Houston and Austin through 2030 while increasing significantly in Portland and Dallas-Fort Worth. The lower carbon emissions for the latter two metropolitan areas likely

reflect a lower projected rate of growth. The strategies that will have the most impact on reducing CO2 are not land use or travel behavior changes; rather they are technical changes in fuel efficiency. In short, improvement in the environmental quality are most likely to follow the same path that has led to dramatic improvements in air and water quality in almost every major metropolitan area: technological improvements.

Figure 6



Unlike comprehensive plans, market economies have mechanisms that adjust spontaneously to changing demand and supply of resources. As one resource becomes more scarce, and its market price increases, investors look for substitutes. Thus, the price mechanism of market economies provides an important way to ensure that the potential costs of depleting finite resources are not completely shifted to future generations (see the discussion in Tietenberg 1988, p. 493). Technological change alters human choices over resources, how technology is diffused through the economy, and how resource availability meets current and future human needs (see also Beckerman 2003). Technological change does not just extend the time horizon in which finite resources will be exhausted. Technological change may radically change human dependence on natural resources at any given point in time.

While natural resources are fixed at any given point in time, the key to sustainable development is their relative scarcity. Thus, coal replaced wood as a primary resource for generating heat. Coal was subsequently replaced by oil in many places. Oil and coal may be replaced in the not so distant future by nuclear power. Solar power may ultimately replace all fossil fuels. Thus, shifting from a choice mechanism that is open and fluid to one that is slow and cumbersome and less open to innovation could significantly compromise sustainability. Indeed, if decision rules are adopted that discourage innovation and economic evolution, current trends and technologies could reinforce unsustainable levels of consumption and energy use.

5. Conclusions and Policy Implications

The successful application of sustainable development policies requires understanding the inherent limitations of each institutional decisionmaking process. Bureaucracies work well when goals are well established, the mechanisms for achieving goals are understood, and broad-based political support exists for the goals and the mechanisms for achieving them (Staley 2001; 2004). These are necessary, but not sufficient conditions for success. Santa Monica, for example, appeared to have this kind of consensus although its program's success has been uneven at best. Sustainable development policy is developed within a legislative framework which is inherently unstable and dynamic (Liu 2006).

Another important limitation of planning is its inability to process complex information in a way that can coordinate a sustainable future. On the one hand, a sustainable development framework presents a coherent set of policy priorities: conserve and where possible preserve natural resource, adopt "environmental friendly" building design, reduce travel and limit the encroachment of human settlements on the natural environment. Yet, little consensus exists outside a few select cities such as Santa Monica and Portland that suggest this is a politically sustainable course of action. If technology shifts resource constraints, social, economic, cultural, and political process must be able to adapt to the new environment through technological change. Legislative decisionmaking processes are superior to market processes only if they can incorporate information unavailable to private decisionmakers (e.g., the practical effects of externalities). To the extent policymakers either misunderstand or underestimate the effectiveness of markets in processing the relevant information about future resource scarcity, sustainable development (and social welfare) may be compromised.

Adopting a legislative or bureaucratic approach to achieving sustainable development goals may be problematic in another way as well. U.S. society and culture places a significant degree of value on individual choice and mobility. States (and local governments) are legally prohibited from interfering with interstate commerce, and this applies to the movement of people and households as well. If a city adopts policies that increase the costs of living without a commensurate increase in the quality of life, it will likely lose population (and tax base) as households move to other cities. Markets, in contrast, can be effective at processing information in ways that meet consumer and household needs, and ensuring technology diffuses to the broad base of society. Legislative decision making might be useful in focusing public opinion on broad issues, but it remains largely unbounded and reflects shifting political needs and

interests. Traditional planning can provide objectives and goals, but it must also recognize and work within the constraints of markets and legislation. Thus, the reliance on institutions must be balanced, and policymakers should avoid putting too much weight on one method of policymaking and implementation.

Sustainable development advocates likely underestimate the degree to which markets can facilitate achieving their own objectives. The open-ended, dynamic nature of market economies are institutionally suited for developing and cultivating new technologies that can solve or address many environmental problems and natural resource scarcity issues. Understanding the role prices play in influencing incentives and decisions about investments in alternative technologies can greatly improve the prospects for sustainable development. In fact, market-based policies might be more effective at improving resource conservation and reducing the human ecological footprint. Economists, for example, have long advocated for the adoption of road pricing to manage roads more effectively (Staley & Moore 2008), variable rate water pricing based on scarcity, and variable rates for energy use to provide more transparent and accurate data to consumers about the relative costs of resource use. Pricing strategies immediately impact a broad base of the consuming public and are likely to result in more effective and long-lasting changes in behavior based on individual decisions about the relative value of using resources for particular purposes and at particular times.

Policymakers should probably avoid the tendency to substitute legislative or bureaucratic decisionmaking to achieve sustainable development goals. Instead, their efforts may be better and more effectively focused on enabling sustainable development practices to emerge spontaneously through market mechanism than prescribing specific outcomes. In general, markets move more swiftly and dynamically to respond to changing consumer needs and preferences than governments or planning. Legislative processes are particularly unstable when these processes provide for significant citizen participation. Planning processes run the risk of choosing the wrong technology and are subject to less economic accountability.

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